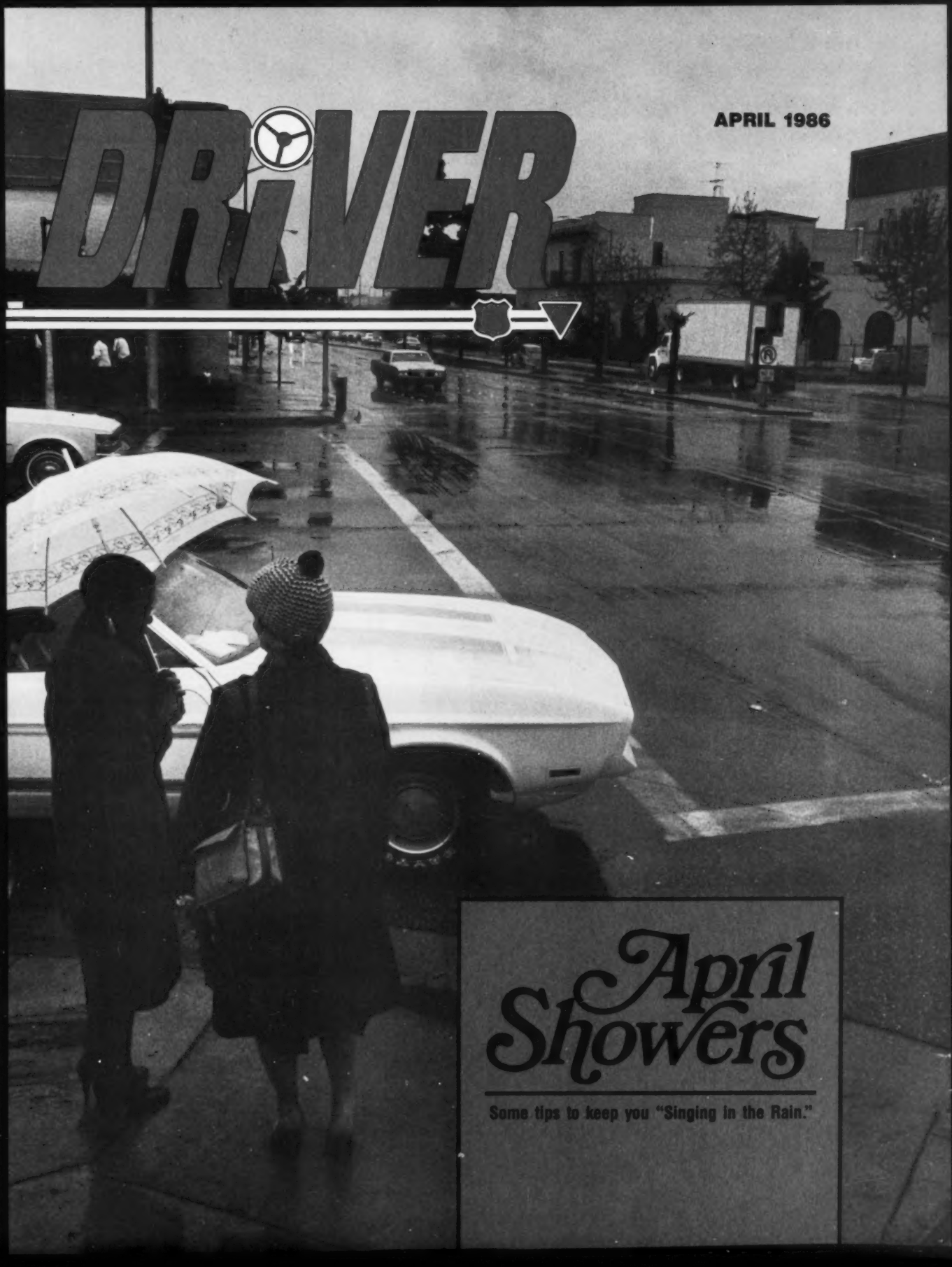
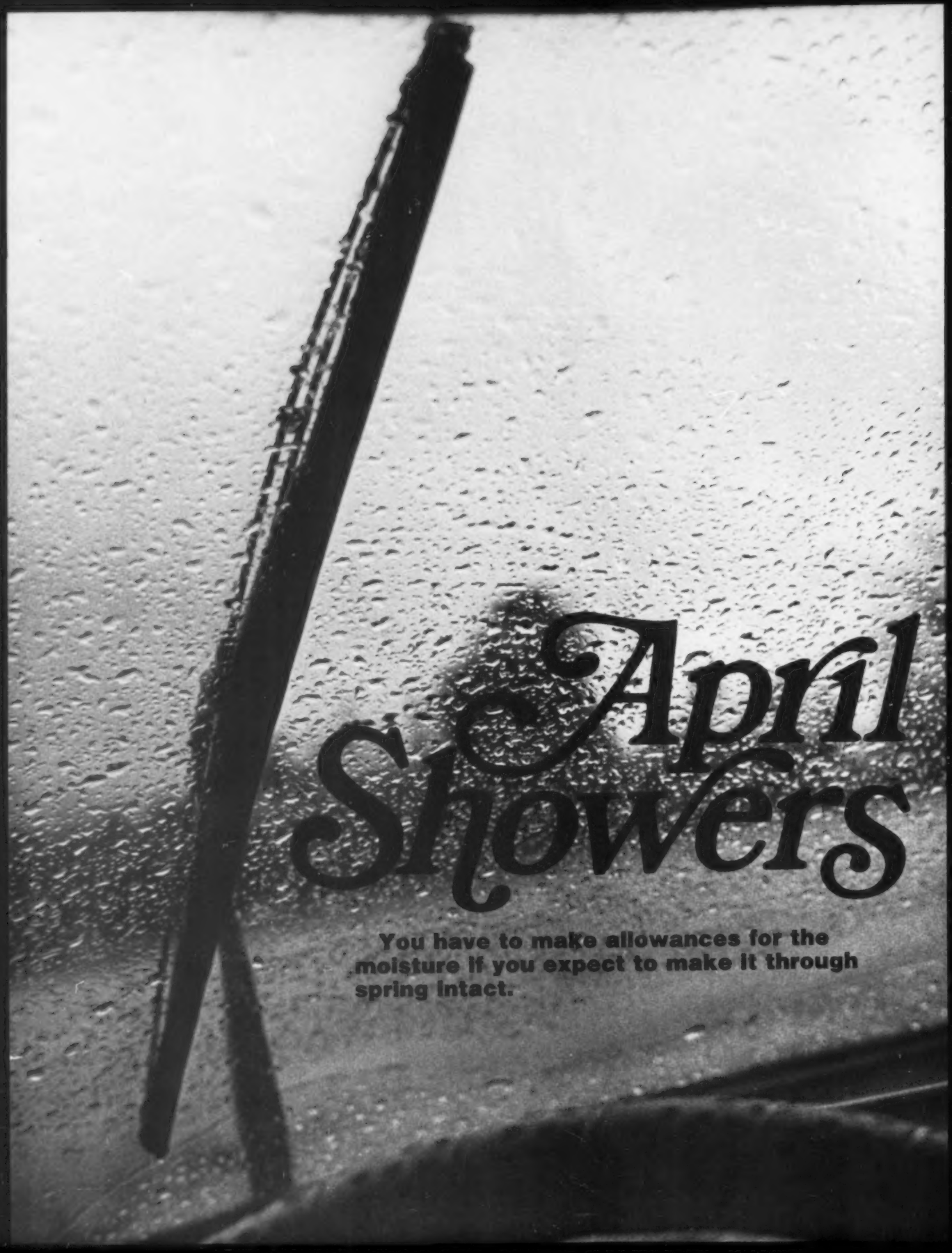
DRIVER

APRIL 1986



April Showers

Some tips to keep you "Singing in the Rain."


April
Showers
You have to make allowances for the moisture if you expect to make it through spring intact.

There's a little poem that begins "March winds and April showers" that makes spring sound very nice — which it can be. But it can also be nasty. Spring is a time of change from winter's cold harshness to summer's heat, and this very changeability means days of mild, clear weather punctuated with periods of thunderstorms, sleet, hail, even ice and snow.

Just about the time you've removed and stored your snow tires, a sloppy spring snowstorm will come along with tons of slush and wet snow for you to slide around on. You're left with two choices. One: Complain and swear your way through the season. Two: Expect surprises and prepare to meet them.

Spring deals in water, just as winter does, the only difference being that spring is warmer (most of the time) and you'll find the water in just about any form from mist to ice. Since a car performs best on dry surfaces and not water, you have to make allowances in order to handle it safely on those days with excess moisture. We'll take the difference forms of water separately.

(above)
Standing water on the road can hide the painted lines that divide lanes or mark speed limits. Sunshine or headlights shining on the water can create a bad glare, too.

(left)
What condition are your car's wipers in? Rain will blur your vision through the windshield, and old, cracked or brittle wipers won't make the glass clear enough to provide a good view of the road.

FOG

You won't have to face fog everywhere in the country, but you will probably be stationed at least once in your career where it occurs. When you do have to drive in it, that's an experience you won't soon forget, especially if it's very thick fog.

Fog is rather similar to the steam in your steam room, except it isn't hot. It is made up of water droplets and is therefore just a cloud at ground level. And it's like steam in another way because you can't see through it.

It's no joke. In a fogbank, things *do* suddenly appear and disappear from your vision, even big things like cars, trees and buildings. Going back to the steam room comparison, the thicker the steam, the more difficult it is to see the person across the room from you. Fog is just like that. Fog can be a light mist or it can be heavy enough to block your view beyond the end of the car's hood.

Because of fog's ability to hide things — cars, trees, even the road — the first thing to consider is whether you can put off your trip. Can you wait until the fog lifts and visibility improves? If you can wait, do so. Fog is something to be taken very seriously. When you drive in fog, at any time it might thicken so much you can't see 20 feet in front of you.

If the fog hits when you're going to work or at other times when you really must drive, be especially careful. Drive slowly and be extra alert. Use your headlights — even in the daytime. This is not so much to help you see (because they won't help much, at least in the daylight), as to let others see you. Your headlights (or taillights from behind) will signal your presence to other drivers.

You might be tempted to use your high beams to see better, but don't. You'll only dazzle yourself and the other drivers as the high beams reflect off the water droplets in the fog. However, if you have fog lights, use them. That's what they're for.

As we were saying, drive slowly. You don't know what's ahead. It might be a slower-moving car without its lights on, or it might be a stalled car . . . it might even be a wreck. Rear-end collisions are very common in foggy conditions. Also very common is running off the road. The road might take a sudden bend, and the fog might have obscured the road sign.

If the stuff is so bad that you can't drive safely, consider getting off the road until conditions improve. If you leave the road, get *far* off and use your emergency flashers. If you just leave the lights on, other drivers might mistake your position for the road and follow your lights right off the pavement.

Speaking of following someone, remember your following distance. In fog, even if you can see markers well enough to apply the two-second rule, it may not leave you enough space because it's difficult to tell what the car ahead is doing. Keep well back and be ready to stop.

Likewise, don't pass anyone in thick fog.

While you drive, run your defroster and windshield wipers to eliminate the moisture that collects on the glass — inside and out. Clouded windows may make it look foggier than it really is.

RAIN AND SLUSH

You may not have to deal with fog, but you'll probably have to face rain a few times, and those spring storms that are about 50-50 rain and snow. These are better than fog in some ways and worse in others.

The visibility will be better with rain, but you'll also have some of the slickest streets this side of glare ice. Dark clouds and dense rain will make it necessary to use your lights once again in the daytime.

As if that weren't enough, water on the road hides the lane markers and turn arrows that are painted on the pavement, and it creates a glare problem from reflected headlights.

In dealing with slickness, your best friend is the tread on your tires. Most people think the tread provides traction for all road conditions, but it is actually designed for wet roads. Racing fans will tell you than on dry surfaces you get better traction from a treadless "slick." The tread is there to provide channels through which the water can pass as you drive over it. Otherwise, the water would build up in front of the tire and you would begin to "hydroplane," a subject we will discuss later.

Always be aware of the condition of your tires and the amount of tread they have left. Replace the tires when they become worn down to the wear bars. To maximize the life of the tires, always keep them at the manufacturer's recommended inflation.

continued

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

APRIL 1986

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(above)
Can you stop in time if someone crosses your path like this? Not if you're going the speed limit on a wet road. Remember that speed limits are for dry streets; reduce your speed when it rains.

(right)
Things disappear in fog just as though they were being swallowed, and they appear seemingly out of nowhere.

Once again, the advice is to drive slowly. Do all manuevers — turns, braking, etc. — slowly. Sudden lane changes or turns might p you into a wet skid and cause you to de.it your car, or someone else's.

Speaking of other drivers, give them all the room you can. You might be driving safely, but that doesn't mean everyone will. You will find other drivers speeding on wet roads, and their skidding could get in your way.

Even if you don't meet speeders, you will certainly meet splashers. As you edge around a puddle, someone will drive through it and throw water all over your windows. If it's raining you probably have your wipers on and they'll clear the glass off in a second. If they aren't on, you will be blinded for the time it takes to get them going.

When that happens, and believe us it will, slow down until you can see clearly again. Just ease off the gas pedal, and brake lightly if you need to. Don't *stomp* on the brake, and by all means don't change lanes while you can't see. That could set up an accident.

STANDING WATER

Remember that puddle you were going around (while staying in your own lane, of course)? You were right to avoid it if you could, for two reasons: You don't know how deep it is, and there might be a pothole hidden by the water. We discuss potholes elsewhere, but think about deep water for a moment.

You could very easily get your brake pads (or linings) wet when driving through a puddle. Try to grip something with wet hands and you'll know how your brakes are working when they're wet. Wet brakes on one side of the car could spin the car around, and wet brakes on both sides could mean you won't stop at all.

So avoid the puddle if you can. But if there's no way around it, just apply the brakes lightly as you go through the wa-

continued

Rough Riding

Those potholes you see in the road, and the ones hiding under puddles of water, are not only ugly, they are also hazardous to your car's health. Potholes can damage tires, wheel rims, suspension, and they can throw the car's front end out of alignment. They're also unpleasant to your spine as your car hits one.

Potholes appear without fail every spring (and sometimes during the winter) in asphalt roads; they're just part of the damage that winter does. They occur this way: Water gets under the pavement through a crack or by seeping down at the pavement's edge. When the ground freezes, the pavement is pushed up. Then when the weather warms again, the soil thaws and the water in it soaks deeper into the ground. This leaves a pocket under the pavement that breaks through when a car runs over it, leaving a brand-new pothole.

It usually takes some time before the road crews can repair them all because there are so many. The road builders estimate that all the potholes in the U.S. combined would make a crater one quarter-mile in diameter and 50 feet deep. Imagine driving off into *that*.

Here are a few hints to match your driving to the road surface and minimize the damage from these little ruts:

- Avoid hitting a pothole if you can. You don't really want to know how deep it is. But watch for other cars too, so that you don't swerve away from the hole only to hit a car. A five-inch pothole will do less damage than a 1½-ton sedan.
- Slow down. You hit a lot harder if you hit it fast, and that will increase the odds of damaging the car.
- When slowing, do so *before* you hit the hole. If you're still braking when you hit the hole, the tire will make contact more solidly and increase the chances of damage. A glancing blow is better than a solid one.
- Keep your tires properly inflated. Tires that are inflated to the proper pressure are less prone to accidents and "injury." Check your owner's manual, or the tire's sidewall for the recommended pressure for the tire.

Check your car's condition often if you have to drive over roads with a lot of holes. Have it repaired immediately if you notice any vibration or shimmy, which could mean the front end is out of alignment. Tires that wear out quickly could be hazardous to your wallet's health.

april showers

continued

If water is deep enough to leave a wake like this, you can be sure it's deep enough to cause braking problems. If you can't avoid driving through deep water, keep one foot lightly on the brakes to keep them dry.

Even a minor pothole like this one can cause tire or suspension damage if you hit it hard enough. Go around holes whenever you can; if you can't avoid them, go through as slowly as possible to prevent damage to your car.

ter. Right foot on the accelerator, left foot on the brake just enough to create a little friction and keep the linings dry. (By the way, this is the *only* time we recommend driving with one foot on the brake. If you drive that way habitually, you only wear out your brakes faster — *much* faster.)

For really deep puddles, there's only one solution — go around. If you go through, you'll find an entirely new meaning for "flooding the engine."

One dangerous step beyond standing water is *running* water. When you see water running across a road, go around and find another route to your destination. Don't drive through it. There might be enough of a current to wash you right off the road, even if the water isn't very deep. And if the road itself is washed away, beware. Any water that can tear away asphalt or concrete is nothing to trifle with.

LIGHTNING

While we're on the subject of rain, let's remember another hazard of the rainstorm — lightning. During a lightning storm, you are safer in your car than outside. If a lightning bolt were to strike your car it would probably travel along the car body and then jump to the ground.

If you find yourself in your car during a lightning storm, don't touch any metal inside — that could make you a part of the electric circuit. If you're outside get inside a car or a building. And keep away from water.

HYDROPLANING

Hydroplaning is something that doesn't happen often, and indeed if you follow the dos and don'ts in this article you can avoid a hydroplaning situation.

Hydroplaning occurs when the car's weight is supported by water as you drive. It's a little like water-skiing. The faster you move, the more water pressure is built up in front of the tires and this water will actually lift your car off the road.

The factors that will affect this process

continued

(above)
Is there enough water here for the car to go hydroplaning? The answer depends on the car's speed, the condition of its tires, and the inflation pressure inside them. For a fast-moving car on bald tires low on air, it's certainly possible.

(right)
When you're passed by a car or truck in the rain, you will often be splashed with a fine, dirty spray or a tubful of water. You will be blinded for a couple of seconds, so slow down until the wipers have a chance to clear your view again.

continued

are the car's speed, the amount of water on the road, the amount of tread on your tires, and the inflation of the tires. The more speed and water, and the less tread and inflation, the more likely you are to hydroplane. So, once again: Drive slowly, watch the tread on your tires, and keep the inflation at the proper level.

An odd fact is that you may not be able to tell when you're hydroplaning. You could be traveling along on a wet street, begin to change lanes and then skid across three lanes or do a 180-degree spin or slide off the road. We consider it a rule: Wet roads equal slower driving.

SINGING IN THE SHOWER

We hope the tips we've given on safe driving will help you make it through this season of changeable weather. If you remember to drive slowly and carefully, you can think of spring rain as just an occasional free car wash.

Roads in low areas may be flooded or even completely washed out. Don't risk traveling through such areas; find another way to your destination.

Using your headlights on foggy days may help you see a little better, but more importantly they will assist other drivers in locating you.

For Vision & Control

Safe motoring in wet weather involves a little periodic maintenance for visibility and stability. The first involves the windshield and its wipers and the second involves the tires and brakes.

The mud and dirty water you encounter in spring will make it difficult to see out through the glass. To get it off the windshield and keep it off, your wipers should be in good condition. Winter gave them ample opportunity to be frozen by ice and then thawed by your defroster dozens of times. This kind of life is short and unpleasant for the rubber blades on the wipers. They get dry and crack, and then they streak the windshield rather than clean it.

Check the wipers out for cracks and brittleness. At the first sign of a streak on the glass, buy some new ones. It may be wise to change them every six months as a rule. But if you don't feel that rich, just keep an eye on them.

Next, the windshield washer solution. You may need even more of this liquid now than you did in winter, so keep the reservoir full. Use the regular non-freezing solution that you use in winter rather than just plain water. It does a better job of cleaning, and you never know when you might get one of those freak spring snowstorms that will ice the world up for a day or so.

For the other windows, keep a spray bottle of window cleaner and some paper towels in the car. That makes it much easier to clean off the windows when you're not at home, and it helps you remember to clean off the *inside* of the windshield to get rid of that film that develops there. This cleaner works great on the mirrors and the headlights, too.

Now that you've done as much as you can to keep the glass clean, let's move on to the stability part.

We've given you the real truth about tire treads elsewhere, so we won't repeat it here. But we will remind you that you need to be sure of the amount of tread. Good tread helps your stability on wet surfaces and helps you avoid the danger and fear involved with hydroplaning, which we also mention in the main article.

To maintain the maximum control of your car, keep your tires properly inflated. Underinflated tires will also contribute to the danger of hydroplaning. Check the inflation at least once a month, preferably more often. One of those pencil-type gauges will work very well.

Your stability is also affected by the alignment of your front wheels. Winter has probably thrown the alignment off, so have them checked. It's a good thing to do every year, anyway.

If your front end is misaligned your braking will definitely be thrown off as well, so it's just as well to check the brakes, too. You can't have the car braking more heavily to one side on wet roads — stability is hard enough with everything in line. Make sure the brakes apply evenly on both sides.

DO IT NOW

Are you one of those people who waits until the last minute to do things? Did you write your term papers in high school the night before they were due? Do you arrive for work only a moment before they count you as late? Do you wash the dishes at home only when you need clean forks for the next meal, or wash your clothes only when you can't find the floor in your bedroom?

If this sounds like you, you are probably the same kind of person who never fixes something broken on the car until it causes you inconvenience or even a near-mishap. Some small problem you meant to get to could become a big problem — at the worst moment.

What is it? A misaimed headlight that severely reduces your vision at night? A broken fan that is no problem most of the time but makes it impossible to defog the windows in cold weather? Old windshield wiper blades that almost-but-not-quite clear off the rain? A slow leak in the cooling system?

There's only one solution for this problem: Self-discipline. Do it *now*. Charge that weak battery before you end up sparkless some cold winter night with no help nearby. Repair that starter that works sometimes (usually when it feels like working), before it decides to be difficult some night when you have an important date. Replace the weather stripping around the hatch before it rains and waterlogs your groceries. Fix the brakes now, before you *really* need them in a panic stop.

Sure, it's inconvenient and a bother. But so is getting stranded or bending up the car.

A believer in the system, William L. Kath, a Ford executive engineer for Car Product Development, sits while an air bag is fired off. The "dust" in the photo is talcum powder, which is used to lubricate the bag in its module in the steering wheel. (Photo courtesy Ford Motor Company)

saving face

Intended as a supplement to the seat belt, the first production-model air bags on American cars have been introduced by Ford.

Automotive air bags have finally made an appearance on American production cars. And they work.

Air bags are safety devices installed in the car that are designed to inflate rapidly in the event of an accident and block the occupant from hitting the instrument panel and steering wheel. By providing a literal cushion for the occupant to hit, they reduce the injuries that might otherwise occur. Air bags have been discussed for years, and the attempts to get them included as optional safety equipment have been delayed again and again.

Now, however, Ford Motor Company has begun offering air bags as options on two of its models, the Ford Tempo and Mercury Topaz four-door sedans. They

are the only domestic automobiles so far to offer this safety feature. Mercedes Benz also offers air bags as an option.

Air bag-equipped Ford Tempos have actually been on the road since early 1985. These are fleet vehicles of such groups as the General Services Administration and the Travelers Insurance Company. 9300 of these cars are on the road today. In these cars, there have been 39 crashes serious enough to set off the air bags, and all bags deployed correctly, preventing death and serious injury. Ford representatives stress that almost all drivers in these crashes were belted in.

Ford tells of a fortieth "crash," in which a Tempo with an air bag was stolen by professional car thieves, stripped and then pushed down an embankment. It hit a tree and the bag deployed correctly — even with the engine off and the ignition lock removed.

In its current development stage, the Ford air bag is offered for only the driver's position. It is mounted in the hub of the steering wheel. An air bag for the passenger side of the car would necessarily be much larger because of the greater distance between occupant and dashboard. This, along with other considerations, complicates the engineering required.

The current system works like this: Four special sensors in the Tempos and Topazes detect accidents by measuring severe changes in the car's speed. The sensors are mounted in the front of the car, two near the front bumper, one in the upper center radiator support and one in the dashboard. In effect, the sensors are able to discriminate between those frontal impacts that require deployment of the air bag and those that do not. They activate the bag when they measure a force equal to a 25 mph crash into a parked car.

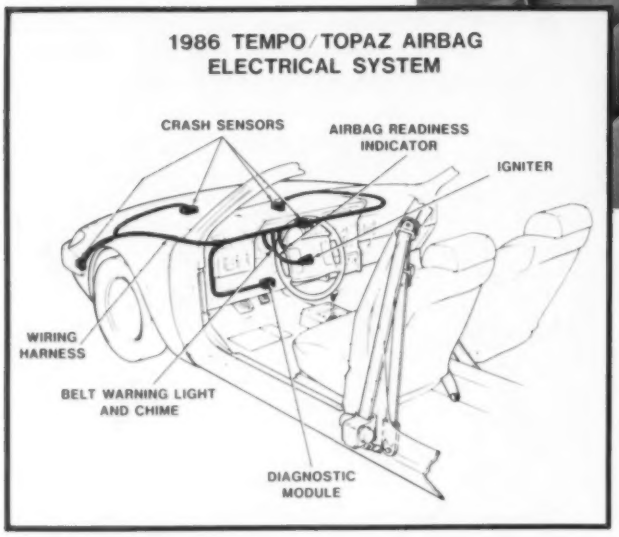
The air bag module in the steering

continued

(top of page)
Driver's side air bags are available as an option on 1986 four-door Ford Tempos and Mercury Topazes. In a frontal collision equal to a 25 mph impact into a parked car, the bag will inflate, keeping the driver from hitting the steering wheel or dashboard.

(above)
Only moments after deployment the air bag is already deflated, allowing the person behind the wheel room to unbuckle the seat belt and get out of the car. At the left is Roger Maugh, director of the Ford Automotive Safety Office and to the right is Helen O. Petrauskas, Ford's vice president for Environmental and Safety Engineering.

(right)
To gather information on the performance of air bags in 9300 specially-equipped fleet cars, the Department of Transportation arranged for the National Response Center to receive reports of air bag deployments.



(above)
The air bag is housed in this fairly ordinary-looking module at the center of the steering wheel on the Ford Tempos and Mercury Topazes. The compartment pops open when the bag inflates.

(left)
A sophisticated system of sensors and a microcomputer control the working of Ford Motor Company's new air bag system.

wheel contains the mechanism to ignite a solid fuel that burns to produce nitrogen gas. The gas fills the air bag, which pops out of the module as it inflates. The nylon bag is about 26 inches in diameter, and fills to a volume of 2.3 cubic feet.

It takes only 15 milliseconds for the sensors to detect the crash and energize the air bag circuit. The bag is deployed in an additional 40 milliseconds (1/25th of a second). The entire process takes 55 milliseconds — very fast, especially when you consider it takes 100 milliseconds for the human eye to blink.

Whenever designs for air bags were discussed in the past, there was concern over the chance they might deploy at the wrong time, or that they might fail to deploy when actually needed. The former problem is handled in the Ford system by the sensors. At least two of the sensors must be triggered — one (or more) of the ones at the front of the car and the one in the dashboard — in order to deploy the bag. As mentioned above, the sensors discriminate between a crash requiring the bag and one not serious enough.

To prevent the latter problem — a bag that doesn't work when needed — the Ford air bag system includes a microcomputer which "self-checks" the circuitry to inform the driver of any malfunction. If anything is wrong, an air bag readiness indicator light on the dashboard flashes a coded signal, which will assist in having the system serviced by trained personnel.

Ford recently gave the news media an advance look at the air bag in action with a mock-up of the driver's position of a Tempo, complete with a crash-test dummy belted into the seat. Roger Maugh, director of Ford's Automotive Safety Office, deployed an air bag for the cameras. It inflated with a loud "bang," too quickly for the human eye to see — even if it didn't blink.

Immediately after the inflation, the bags are designed to deflate. This permits the occupant of the car to unbuckle his or her seat belt and exit the car.

Each time Ford's representatives spoke of the bag, they referred to it as a "supplemental air bag system." That is, it is not meant as the only means of protecting the driver. It is designed to function as additional protection along with the primary system, the seat belt. Helen O. Petrauskas, Ford vice president for Environmental and Safety Engineering, said most experts agree that half of all traffic fatalities could be avoided if everyone buckled up.

In the case of a multiple crash, such as a chain rear-end collision, seat belts are vital, because air bags are good for only one impact. Further, the bags are designed to respond only to frontal collisions.

This additional protection is not cheap. When Ford's air bag option was first made available in March of this year, it had a list price of $815, an amount which Ford stressed does not cover their costs. However, they said the price to the consumer could come down if a large demand for the bags brings about a high volume of production.

Whatever the future of air bags, we advise you to continue to buckle up. It is still your best protection.

Timely Topics

SEEING IS STOPPING

You've probably seen enough of them now to wonder about those high-mounted brake lights. All 1986 model cars are required to have this third brake light, which is mounted near the vertical center of a car's rear window in the direct line of sight of drivers in following cars.

Several studies have demonstrated that this new, high-mounted rear brake light reduces both the number of rear-end collisions and their severity. The National Highway Traffic Safety Administration has estimated the lights will reduce rear-end collisions by 53 percent, saving consumers approximately $400 million per year in car repair costs.

And even when cars with high, center-mounted rear brake lights are hit from behind, the damage is less costly to repair, probably because drivers in the rear are already beginning to slow down before the impact.

Older cars can be retrofitted with the high-mount brake lights. Some auto parts stores are now selling the lights, which you can install yourself, for about $20. Some car dealerships are also retrofitting cars with the brake lights for considerably more. Check with auto parts stores and car dealerships to see what is available in your area. (USAA AIDE)

"NO START"

Could there be anything more aggravating than going out to start your car on a chilly, rainy morning only to find it just won't start? Your car can fail to start for a variety of reasons, many of which can be prevented.

The most common reason for a "no start" is leaving the headlights on. Leaving the lights on for just a couple of hours can be enough to drain the battery. The use of a battery rated too small for your car can also reduce battery life and lead to starting problems.

While knowing the reasons for starting failure won't help you if you are stranded, there are some warning signs that point to a car needing attention before you have a problem. Slow cranking of the starter, lights that dim and radio static at idle are a few of the warnings. Turn signals that vary or are slow could mean a worn battery and possible future problems.

Visual inspection of the battery and the connections from time to time can give a few clues also. Except for sealed-cell, maintenance-free batteries, the water level in the battery cells should be checked periodically. Dirty or cloudy electrolyte or excessive water usage can mean the battery needs replacing. Excessive corrosion of the terminals, frayed cables, broken hold-downs, a split cover or casing and soot on the underside of the vent caps are warnings that the battery may fail.

Other forms of owner neglect can also contribute to starting problems. A loose fan belt, frequent short trips, a faulty voltage regulator or an engine that needs a tune-up can cause a "no start" situation. To determine whether your car needs a tune-up, check your owner's manual for the proper service intervals.

A few minutes of your time may prevent the inconvenience and expense of a road call some rainy night. (Automotive Information Council)

HIGHER DRINKING AGE REDUCES FATAL ACCIDENTS OF YOUNG DRIVERS

Raising the legal minimum drinking age substantially reduces the number of young drivers involved in fatal motor vehicle crashes, according to the National Highway Traffic Safety Administration (NHTSA).

A recent NHTSA statistical analysis of 13 states that raised the minimum drinking age to 19, 20, or 21 shows a 13 percent reduction in fatal accident involvement among drivers affected by these law changes.

Applying the 13 percent reduction to the 44 states which had higher than 18 drinking age laws in 1984 results in an estimated 700 lives saved nationwide during that year. According to the agency, if all states had a minimum drinking age of 21, an additional 400 lives could have been saved in 1984.

NHTSA Administrator Diane K. Steed said, "We welcome this news as further evidence of the benefits of raising the minimum drinking age. This important step, however, represents only one part of the solution to the tragic problem of drunk drivers on the nation's highways.

"Even if the drinking age of 21 were in force in all states in 1984, almost 20,000 lives still would have been lost in alcohol-related crashes," Steed said. "We need to continue to fight drunk driving at all levels, through a combination of solutions which include stricter state laws, improved enforcement, better public education and continued media attention."

According to the federal safety agency, drivers in the 18-20 year old age group have been disproportionately represented in fatal alcohol-related traffic crashes. Furthermore, the presence of different minimum drinking ages in adjacent states has created "blood borders," which have encouraged young persons to drive across state lines for access to alcohol. To counter these problems, President Reagan signed legislation in 1984 which strongly encourages states to adopt a minimum drinking age of 21. The federal law requires the withholding of a portion of federal highway funds from states without such laws by Oct. 1, 1986.

Fifteen states have adopted age 21 drinking laws since the signing of the Federal law, resulting in a total of 38 states which have established age 21 as the minimum legal drinking age.

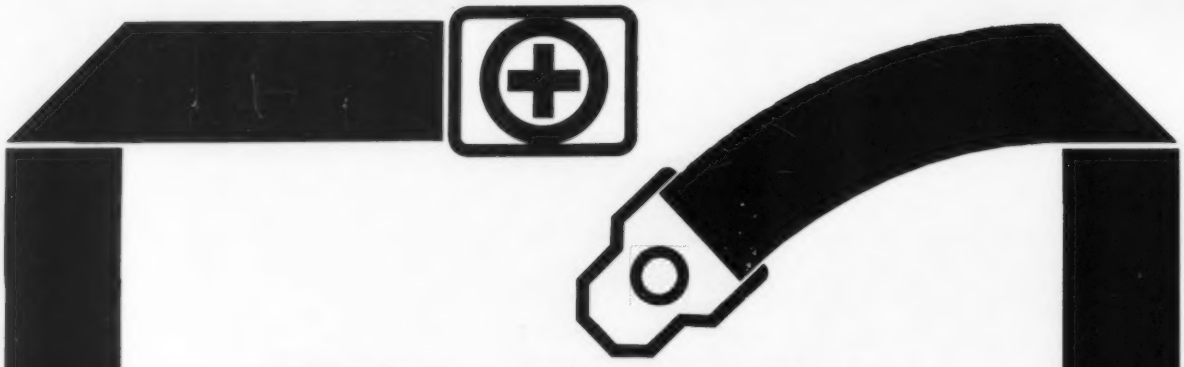
BLOOD ALCOHOL CONTENT

A safety officer brought to our attention the fact that the December DRIVER gave two different designations for the level of intoxication. In a "True Accidents" item (page 17) the Blood Alcohol Content of .27 is described as "nearly three times the legal point of intoxication." On page 16, a story from a U.S. Army base in Germany told of a blood alcohol test result of "1.7, more than double the legal driving limit of .8."

This sounds contradictory, but it is only the result of the placement of a decimal point. The German .8 is a European standard that is equal to a *.08* on the scale used in the U.S. This compares closely to the .1 that is the legal level of intoxication in most places in the United States. (The Europeans have a slightly tougher standard than we do.) Of course, on the U.S. scale any person with a .8 BAC would be dead.

Moving the decimal point, the German legal intoxication limit becomes .08 and the man's BAC becomes .17, which is more understandable. Although this is a high intoxication level, at .17 some individuals with a great alcohol tolerance still feel they can drive safely.

We regret the confusion, and we'll try to keep things clear in the future.



Hindsight

by A1C Timothy E. Biesecker
96th AMS, Dyess AFB, Texas

In November of 1984, I was involved in an automobile accident while in transit from Keesler Technical Training Center, Miss., to the 7th Bomb Wing, Carswell AFB, Texas.

After completing 10 months of electronic warfare systems training, I was delighted to be home with my family and friends. During the time that I had been on base seat belt use had become second nature. But now I was home among my friends who had never been subjected to the same emphasis on the use of seat belts as we military members. I found in most of my friends' cars their seat belts were not maintained or were hidden behind the seats.

One evening a friend and I decided to drive up to the mountains. While en route, approximately three miles from my house, a driver who was following another car failed to yield right of way at a stop sign. Our car impacted the individual's car clean broadside and both cars slid off of the road and into the ditch.

At the point of impact, my friend and I both sailed forward, hitting the windshield. My head went approximately halfway through the windshield. I then came back through the windshield, nearly cutting off my left ear. When the cars stopped, I felt a cooling sensation on my face. Touching my face, I found that I was bleeding profusely. I quickly climbed out of the car to find that a crowd had gathered. All of the onlookers stood staring at me while I bled. In panic and shock I demanded someone to get me a towel and to see a mirror. Looking into it I found that my right cheek was quite maimed, my nose, chin and left cheek had severe cuts. My forehead was also covered with many smaller scrapes.

My friend and I were soon rushed to the hospital. Upon arrival, I was advised that I would need emergency plastic surgery. I was admitted to the hospital and the following day the surgery was performed. It has now been a year and three months. Since then I have been through two more plastic surgery revisions and various other doctor's appointments. Due to the circumstances of the accident, it has cost me money, setbacks to my career, some permanent scarring, delays in my training, use of personal leave and grave degrees of suffering.

At this time my condition has greatly improved. Thanks to modern plastic surgery my scarring was kept to a minimum. This complete ordeal, however, could have been avoided by simply buckling my seat belt.

Pumping vs Squeezing

A reader wrote us recently expressing confusion about our advice to "pump" the brakes to control a skid. He had heard experts recommend "squeezing" the brakes because "pumping" would lock up the wheels. But we have not been inconsistent with the safety experts because we have never advocated locking up the brakes. The problem is a confusion of what the expressions mean.

When some people think of the expression "pumping the brakes," they might be thinking of something like "pumping iron," a vigorous, somewhat violent action. On the other hand, when they use the expression "squeezing the brakes," they think of something like "squeezing the trigger" on a firearm, a careful process designed for maximum control.

When we have used the expression "pumping the brakes" we have always meant an easy action to help maintain control. But obviously there is confusion, and we think it is just a misunderstanding of the words being used. Let's try to straighten it out.

When you skid on slippery road surfaces such as ice and water, you must not only regain control, you must also avoid making things worse. You must have control of the car's steering so you can get out of the skid. But steering control is gone unless the wheels are rotating, and too much foot on the brake will lock the wheels. Therefore, you need controlled braking.

To control braking, you must apply *only* light pressure on the brakes. To make sure they remain rolling, pressure must be intermittent, not constant.

Therefore, "pumping the brakes." or "*squeezing* the brakes." It is the same thing, in our view.

"Pumping the brakes" does not mean, and never has meant, violently crunching the brake pedal to the floor over and over again. That would be like a series of panic stops. We have tried to make that clear each time we explain "pumping" the brakes, but obviously sometimes we aren't successful.

Here's what we recommend: Press lightly on the brake pedal. Let off. Press again. Let off. Keep at it. This *slows* the rotation of the wheels without *stopping* that rotation.

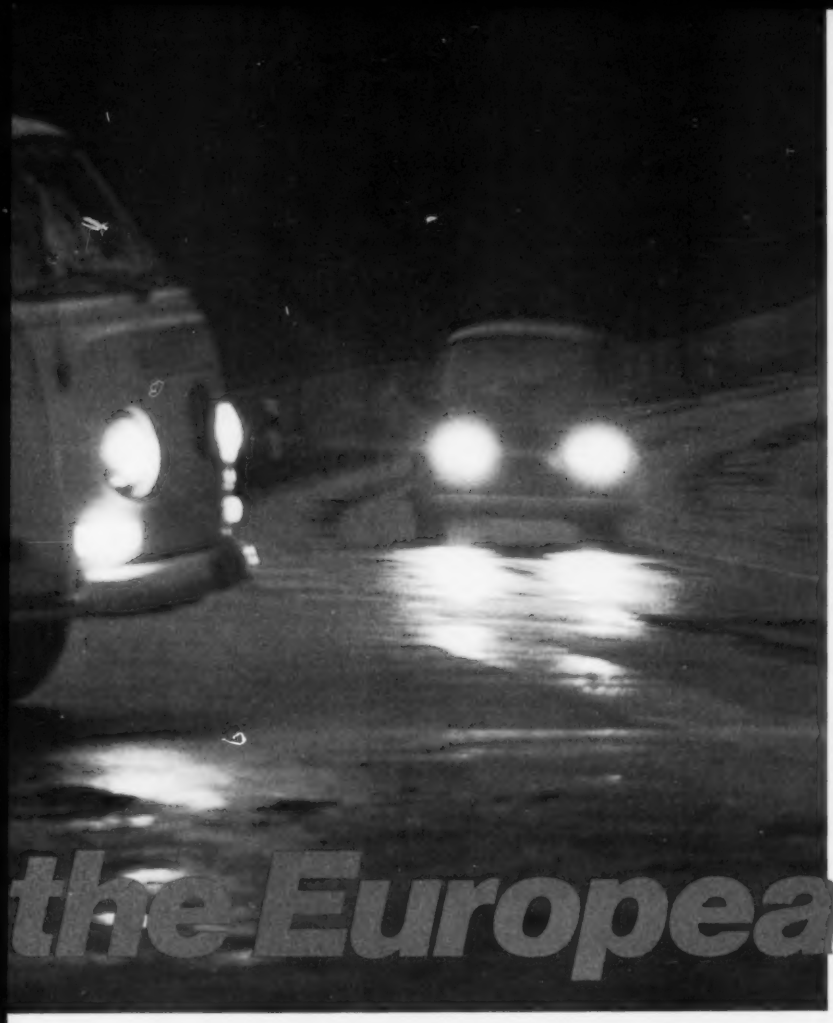
Now, whether you want to call that technique "pumping" or "squeezing," it's all the same to us. We'll try to keep it clear in the future.

Driving and Vision

Driving an automobile in Europe is an unforgettable experience. Auto routes range from high speed autobahns to poorly lit country roads barely wide enough for one car. One must be capable of split second scanning and interpretation of road signs. Because driving conditions are somewhat different than in the United States, many interesting coversations between the pilot and navigator of the automobile occur.

Ninety percent of all driving decisions are based on visual input — ability to see signs and traffic, ability to correctly judge distance, and ability to use peripheral vision (see "out of the corner of the eyes"). The better your vision, the quicker your reaction time to driving situations will be, because you will be able to see the hazard sooner. Fast speeds on the autobahn make quick decision-making essential.

In fall and winter months, weather conditions can change rapidly and make it more difficult to see. Because the days



the European View

by Capt. Thomas Finley, BSC
APO NY 09012-5300

are shorter, driving at night will be more common. Heavy fog, rain, and snow will significantly reduce visibility, making driving more hazardous.

Several safety measures can be taken to prevent driving mishaps. The first measure is to assure your vision is as sharp as possible. Routine eye examinations can alert you to early changes in your vision. Prescription glasses and/or contact lenses should be periodically updated to provide you the best vision possible. If you are travelling away from home, pack a spare pair to avoid having to replace a broken or lost lens in a strange city.

Quality sunglasses (prescription if necessary) can help reduce uncomfortable glare when driving during the daytime. Squinting against the sun's brightness will quickly tire both the driver and his eyes. Do not drive at nighttime with sunglasses because they seriously decrease the ability to see objects.

The next step is to maximize your ability to see when you are inside the automobile. Local German laws state all windows must be completely clear of snow and ice. Too many people clean only the front windshield and ignore the side and back windows. This seriously impedes peripheral vision and prevents seeing anything or anyone behind and to the side of your vehicle. Keep plenty of windshield washer fluid in the car; replace windshield wiper blades if streaking occurs. Also, the inside of the windshield should be clean. Smoke and grime can build up and easily impair vision. Make certain the windshield defroster works properly. Periodically clean the front headlights and assure they are correctly aimed. These measures will increase your ability to see when driving.

A final step is improving your visibility to other drivers. Taillights and turn signals should be in proper working order. Rear fog lights dramatically improve the ability to be seen in heavy fog compared

continued

continued

Occasional glancing at scenery while driving will help you remain more alert, but be aware of your surroundings and always look for road hazards.

to normal taillights. Motorcyclists should wear bright colored clothing and place reflective materials on their helmets and cycles. Using the headlight during the day will also make you more visible.

These safety measures can increase your visual awareness and help others see you while driving, making your trips a more pleasant experience. Good judgment and obeying the laws of the road are also important. Try to do most of your driving during the daytime when your vision is best. Everyone's vision will decrease to some degree at night, making driving a more worrisome task.

Occasional glancing at scenery while driving will help you remain more alert, but be aware of your surroundings and always look for road hazards. Increased driving speeds require more intense visual concentration, often resulting in fatigue. When you feel tired, pull off the road and take a break. Never drive while under the influence of alcohol or medications that cause drowsiness. Drive with a "see and be seen" attitude. Happy trails.

Behind the Blue

by Cadet Major John Park, AFROTC
University of Florida

(Editor's note: We are printing this to show the life-saving value of occupant restraints. C/Maj. Park's father is now back at work, a direct result of his having buckled up.)

The phone rang. I opened my eyes and moaned. It rang again. Slowly, I crawled out of bed and picked up the receiver.

"Hello," I said in a hoarse voice.

"Hi, John . . . listen, I have something to tell you."

I realized it was my younger sister back in Springfield, Va. She didn't sound just right and I started waking up more quickly.

"What's the matter Cori?"

"Well, John . . ."

My sister started to cry. I never thought my worst nightmare would happen . . . but it did.

"Cori? Cori, what's wrong?"

I then heard the voice of my godmother on the phone. She told me what I wanted to know.

The night before, around 11:30 pm, my parents were involved in an auto accident. The driver of the other car had fallen asleep at the wheel and was killed on impact. He was 25 years of age, a father of three. My father was driving; Mom was in the passenger seat and my brother was asleep in the back. My father had swerved our Honda in order to take the brunt of the impact from the oncoming car. The seat belt he was wearing was the only thing that saved his life. He had received 42 pints of blood during the night and was not expected to hold on much longer. My heart pounded in such a manner I thought it would burst. I knew I had to comfort my sister and more importantly to see my father immediately in case, God forbid, he should die.

I packed my clothes and made arrangements to leave, never knowing if my father was still alive. Upon arriving in Washington, I grabbed my bags and looked for my sister. As I walked towards the exit she saw me and came running. Our happy Air Force family seemed to be in a complete shambles.

My godparents immediately told me that my dad had stabilized a bit and tried to prepare me for the worst. We headed for Andrews AFB to see my mother and brother. Both of them had a broken elbow and leg. My mom also suffered a cut over her eye and a broken thumb. I hugged them as best I could and went to see my father. He was at the shock-trauma unit at Prince George's County Hospital, about 20 miles north.

Only members of the immediate family were allowed in the Intensive Care Unit. My sister and I walked in very quietly. She took me to his bedside because she had visited once that afternoon. I breathed deeply when I first caught sight of him. He had seven tubes running into his body, not to mention the network of IVs in his arms and neck. He had so much wrong with him the staff had not even documented all of it. It had been 18 hours since the accident. His legs and right arm were crushed; too many fractures to count. Only his left arm was unhurt. I approached the bed and looked down into my father's eyes. He was very much awake and recognized me instantly. Tears of relief rolled down his face as I stroked his forehead. I then told him that I loved him and that my mom and brother were just fine.

I looked up at a nurse who had been with my dad since the accident. She informed me that he had no head or spinal injuries because he was wearing his seat belt.

I noticed that my father's lips were shaking and he jerked slightly as he tried to talk to me. I tried so desperately to understand his choked-up garble. It was no use. The respirator down his throat was obstructing his urgent message to me. I calmed him down but he still wanted to tell me something. I tried to imagine what could be so important.

"You want me to tell mom that you love her," I said.

My father nodded his head furiously as more tears rolled down his face. This was my breaking point. I just couldn't believe that my father, a lieutenant colonel in the Air Force and the backbone of our family, was lying there helpless.

After this initial shock I started to realize what was really behind the blue. I received calls from generals and colonels who wanted personal information about my father at all times. I could tell these people cared about my family, but it went one step beyond that.

I had somewhere along the way decided to quit school for a semester and get my family back together. Being the oldest of three, I didn't care how long it took or what I had to sacrifice. Then I received a call from a colonel in my dad's office at the Pentagon. He sat me down and we had a talk/counseling session about my situation. I really was surprised about how well the situation had been evaluated. Colonel Perkins assured me that everything would be taken care of. He had been assigned to help out my family. And that was his only job. He helped me pay the bills and take care of the insurance. He made sure we had a lawyer appointed through the Air Force too. Last but not least, we discussed my situation. Colonel Perkins had a feeling I was going to take things upon myself and drop out of school. He asked me how my father would feel about it. Soon I realized that my mom and brother would be out of the hospital and there was little I could do that he couldn't. My father nodded when I told him my decision. My mom was skeptical and afraid to let me go. A few days later she gave in and was determined to get through this hardship.

The accident involving my family happened on July 27, 1985. My dad's recovery was expected to last over a year. I am happy to report that he has made an astonishing recovery and pending complications, should be home by Christmas. My brother and mother are doing just fine. My sister has started her first year at Florida State and I am currently a junior in Air Force ROTC at the University of Florida.

Thank you for letting me share this very personal experience with you. The Air Force and the people who support it have proved themselves to my family and me. It is my pride and joy to know that someday I will be part of that team.

TRUE ACCIDENTS

Following are a few reports of accidents involving Air Force members. We have removed names and references to dates and places.

A note to DRIVER readers:

There are many enlisted mishaps in True Accidents and few involving officers, which has brought us a couple of complaints charging us with an anti-enlisted bias. We are not against enlisted people, nor are we trying to set them up as a bad example. However, the great number of enlisted accidents needs an explanation.

Hundreds of military people die each year in private automobile accidents, more than from any other cause. The ones who have the most accidents are younger military members, who happen to be mostly enlisted people.

Because younger drivers have more accidents, insurance companies charge them high insurance premiums. They do not hate young people, they just have to pay a lot of claims for accidents involving the young. Likewise, DRIVER does not hate young people or enlisted people. We are merely reporting what is happening, focusing our attention where the problem lies.

As for officer accidents, we do print them; there were five during 1985 (see March, April, June, July and December). That seems like a low number, but officers are involved in only about five percent of the fatal accidents each year. This is to be expected, since there are relatively few officers and they are older, on the average. The complaints have suggested that we use a proportional number of officer accidents, based on total accidents. It is not our intent to do a quota; however, the five printed in 1985 is *over* five percent of the total of 91 True Accidents.

Another concern was about the large number of fatal accidents involving drugs, mostly alcohol. Once again, we use a lot of them simply because there are a lot of them. Most involve enlisted people because most accidents in general involve enlisted people. And again, it is simply a fact, not something we are using to hold anyone up to shame.

Our purpose in printing True Accidents, and indeed the whole purpose for DRIVER, is to show our readers what causes auto mishaps, in the hope they will avoid the same mistakes made by the victims. We hope the reports in True Accidents will have this effect, and not the effect of angering any person or group.

EXPLORING IN THE DARK

A technical sergeant drove with three friends from their overseas base out into a wilderness area at 7:30 p.m. to explore. They were in a four-wheel drive vehicle with no top or roll bar and a right hand drive. The front seat had seat belts, which were being used; the rear seat had no belts. The roads were unpaved and very rough. The four men were still exploring after dark and they became lost for nearly an hour because of the extreme darkness. They stopped twice to get their bearings, each time consuming one beer apiece. The vehicle had clutch problems, so the driver kept it in third gear, which limited their speed to 30 mph. At about 11:30 p.m. they were driving down a hill on their way back to town. There was an unmarked intersection at the bottom of the hill. The driver had drifted off the road to the left, going up on a small embankment, when he suddenly saw a closed gate and fence stretching across the road only 20 feet away on the other side of the intersection. He swerved sharply to the right to avoid the gate and the vehicle overturned. One back seat passenger was thrown out and the other three were underneath the car. The two passengers managed to free themselves, but the driver was pinned underneath. Two of them went for help on foot; they were picked up by a passing motorist, who drove them to a fire station. The driver was already dead by the time the ambulance arrived. He had suffered a broken neck and a crushed chest.

BOTTLE

A staff sergeant was driving east in a rural area on a two-lane asphalt road at about 11 p.m. The road was straight and level and it was dry. The car ran off the road to the right, onto a shoulder of loose gravel. Apparently trying to regain control, the driver overcorrected and lost control completely. The car continued to skid to the right, hit a chain-link fence and then rolled several times, finally landing on another chain-link fence. The driver, not wearing his seat belt, was thrown out. He died of head and chest injuries. A partially empty bottle of whiskey was found in the car.

LEFT TURN

After having finished a night shift on base shortly before, an airman was riding his motorcycle westbound on a city street approaching an intersection at 9:30 a.m. He was wearing his helmet, he had his cycle's headlight on, and he was traveling the legal speed limit, 40 mph. A car driven by a civilian was eastbound on the same street. Both had a yellow light. The car turned left toward the intersecting street, directly in front of the airman. The airman tried to stop and the cycle skidded 50 feet, went down on its side, then skidded another 23 feet, impacting the right side of the car. The airman died of massive internal injuries.

REAR-END COLLISION

An airman was riding his motorcycle at 10:15 p.m. with a civilian as a passenger. They had just left a bar where they had spent half an hour and each had had two beers. Traveling southbound on a street with a posted speed limit of 30 mph, they approached an intersection where a car was stopped at a red light. The cycle was moving at an excessive speed and the airman did not slow down in time. Trying to stop, he lost control of the cycle, which laid down and crashed into the rear of the stopped car. The passenger was seriously injured, and the airman received massive head injuries despite his helmet. He died two and a half hours later in the hospital.

RAN RED LIGHT

About 10:50 p.m., a technical sergeant was driving west on a street that had posted speed limit of 40 mph. He had the green light and he was in the process of making a left turn at an intersection. Another car was northbound on the intersecting street, also posted for 40 mph, traveling over 50 mph. It ran the red light and hit the sergeant's car broadside in the intersection, knocking it into the median. The sergeant suffered chest injuries and a severed spinal column. He was taken to the hospital where he died six days

later, never regaining consciousness. The other driver was charged with driving under the influence of alcohol.

CRASHED INTO TREES

After having an argument with his wife, a staff sergeant left his house at midnight. At 6 a.m., his car was found off the road near an intersection. The sergeant's body was inside. Investigators determined that sometime after 4 a.m. he had apparently lost control of the car on a curve, went off the right shoulder and crashed into some trees.

ALCOHOL

An airman was riding his motorcycle off base at about 5:30 p.m. He had been drinking. He ran off the road on a right hand curve and hit a utility pole. He suffered a semi-decapitation and died at the scene. His Blood Alcohol Level (BAL) tested out at .17, far above the legal level of intoxication, .1.

SPEEDING

A staff sergeant was driving west on a divided highway at high speed, perhaps 65 to 70 mph. The posted limit was 45 mph. When he reached a right hand curve he was moving too fast and the car skidded to the left into the median, with the right side of the vehicle leading. It continued to rotate and as the tires struck the pavement of the eastbound lanes, the car rolled one and a half times. It came to rest in the eastbound slow lane. As the car rolled, the driver was ejected. He came to rest 60 feet past the car. He suffered massive head and internal injuries and he died in the hospital.

JOGGING

At about 11:30 a.m. an airman was on his lunch hour, jogging east along the north side of a road. The road was a two-lane one-way access road for a highway, with the traffic moving eastward. Without looking, he began to move across the road to the south lane. He was hit from behind by a pickup truck. He received multiple injuries, including a broken neck and back, crushed chest and two broken legs. He died at the scene.

FATIGUED

It was 3:40 in the morning, and a senior airman was on PCS leave, driving north on an interstate highway on his way to his new base. The route was a four-lane divided highway with a grass median. Driving in the left lane, he allowed his car to drift onto the gravel shoulder of the median, then overcorrected to the right. The car traveled across both northbound lanes and collided with a guardrail. Because he was not wearing his seatbelt, the driver was thrown out of the car into a water-filled drainage ditch. The car rolled on its side and continued nearly 200 feet down the road before stopping in the center of the northbound lanes. The driver was taken to a hospital where he died about 5:30. Investigators determined fatigue had caused the accident.

HEAD-ON

Leaving work after her regular shift at 4 p.m., a staff sergeant drove to visit her new PCS base, about five or six hours' drive away from her present base. Her child was safely buckled into a child restraint in the front seat. She had been given a couple of days off, and she had an appointment for the next morning at 9 a.m. with personnel at the new base. At 8:30 a.m. she was still on the road, 25 miles from the base, driving south on a two-lane highway. She swerved to the left, directly into the path of a semi. They collided head-on, and the staff sergant was killed. Her child was hospitalized with moderate injuries.

BROADSIDE

A technical sergeant had been visiting relatives and he was driving back to his base at about 11 p.m. Heading south, he reached an intersection, where he made a left turn. When he was in the middle of the intersection, his car was hit broadside at the driver's door by a modified pickup. The sergeant received massive injuries and died at the scene. The other driver received only a bloody nose from hitting the steering wheel. He left the scene of the accident, but was later caught by police and charged. It was discovered he had been drinking.

DRUNK DRIVING

A captain had lunch with a friend on base, during which he had at least four beers. At about 2:30 p.m. they both drove to the friend's off-base residence, and then the captain walked to a nearby bar, arriving at 3. He drank at least six mixed drinks in the next 2½ hours. During this time he tried twice to call his estranged wife, but was hung up on each time. Witnesses said he looked very intoxicated. At 6 p.m. he walked back to the residence. About 7:40 that evening he was seen driving his car, and having difficulty in paying a fee at a toll gate. Driving east on a two-lane highway, he drifted into the westbound lane, narrowly missing a motorcycle. He continued drifting from lane to lane and then rear-ended another car, which then left the road to the right. He continued to weave into the westbound lane and hit a flatbed truck head-on. He was pronounced dead at the hospital at 8:55 from massive head and chest injuries. The tests put his Blood Alcohol Level at .24.

ALLERGY

From 7:30 on, a staff sergeant spent most of the morning preparing food for an office lunch. She left about 10 a.m. to buy more food and some over-the-counter medication for an allergy she had to one of the foods. During the lunch, she ate little but had four beers and part of a mixed drink. Around 1 p.m. she went out to purchase more beer, and she continued drinking until she left the party. Witnesses said she did not appear drunk and that she said she was okay when others asked if she should drive. No one saw her leave, but she visited her office about 3 p.m. for a moment. No one saw her again until just before 4 p.m., when she was seen driving north in the inside lane of a highway, apparently returning to the base. Another driver several car lengths behind saw her swerve across the outside lane onto the emergency lane, where her car hit a semi that was parked there while its driver checked out a problem. The sergeant was killed. Investigators discovered she had taken two tablets from the package of medication, twice the recommended dosage. There was a label on the medication's package warning against mixing it with alcohol, but she had disregarded it. This, combined with the high level of alcohol in the body (.23 Blood Alcohol Content), had led to the accident.

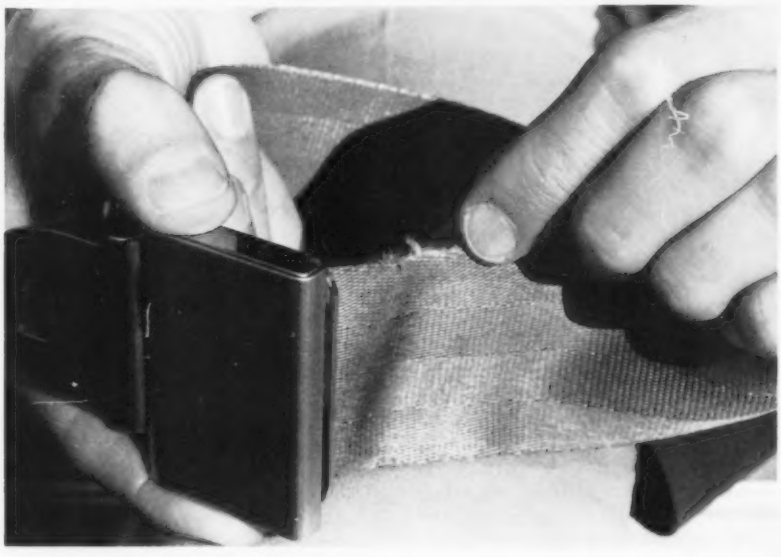
PINNED

Returning to his overseas base at about 11 p.m., an airman was driving his motorcycle north on a city street. He was unfamiliar with the road because he was new to the base, and he was traveling at high speed. The road took a moderate curve to the left and he failed to negotiate the curve. His cycle hit a small curb used as a road divider and then went on to hit another cement curb. At this point he was thrown off the cycle. He was airborne until he hit the grill of a car that was stopped at a stop sign. His motorcycle followed him, pinning him between the two vehicles. The causes of the crash were the high speed of the motorcycle, the difficulty in seeing the curb, and the high level of alcohol (.34 BAC) in the airman's body.

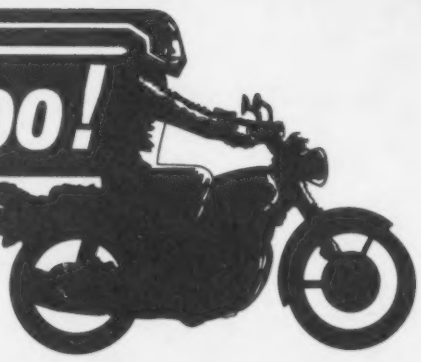
Belt Condition

Seat belts are our first (and best) line of defense against injury in an automobile accident. But like any other device they will wear out with time and regular use. The nylon webbing is very sturdy, but it will eventually fray and weaken. So you need to be aware of what condition your belts are in.

Once in a while, check them for excessive wear. If you want to clean the belts, use only a solution of mild soap and water; anything caustic might damage them. Keep the belts untwisted at all times, especially when they are worn. Make sure the buckles work and will fasten and release easily. And always look for signs of fraying on old belts. Replace them when necessary; your auto dealer or auto parts store will have replacement belts.



It Happened to Me, Too!



by Maj. Christine B. Saalbach, USAFR
926th TFG (AFRES)
Naval Air Station
New Orleans, La.

I was inspired last evening after reading the January issue, specifically "It Happened To Me," and I decided to write my story. If any personalized tale saves a life or a limb by encouraging use of safety equipment, it's worth telling.

There I was, astride my 1980 425cc motorcycle, heading to work on the graveyard shift. I always traveled this way to work and was well aware of the built-in hazards; the potholes, the oil strip on the road, the railroad tracks, and curves where gravel was likely to be found. The trip from home to work was five miles and, except for changing weather conditions, the biggest hazard I faced was other drivers. Both the late-night trip to work and morning trip home were a challenge. Even though the traffic wasn't heavy, with reflector strips on my motorcycle jacket and helmet, and headlight on, the drivers just didn't seem to take note of a motorcycle. I came close to a lot of accidents because drivers failed to look before making lane changes or turns.

My husband and I owned a motorcycle dealership in a small east Texas town. I worked for the Postal Service at night; he managed the dealership during the day. We stressed motorcycle safety and wear of protective gear to our customers. We included a free helmet with the sale of a motorcycle and recommended the wear of the helmet, even in the absence of a mandatory helmet state law. We were fond of the slogan, "Those who don't wear helmets don't have brains enough to protect." I attribute the fact that I'm able to tell you my tale to that attitude towards wearing a helmet that midnight on Memorial Day eve in 1980.

I was on a four-lane road with a center turn-off lane within city limits. A car approached on a side street that formed a right Y cut-off from the main street. I flashed my headlight a few times from bright to dim. In daylight hours I watched drivers' eyes to tell if they acknowledged my presence, but at night I watched the tires.

The car slowed to stop near the intersection, but then it was obvious from the tires that his intention was to run his stop sign. I maneuvered from the passing to the right lane and laid on the horn while adjusting my speed to avoid hitting the car broadside. The driver must then have panicked and stopped dead in the path I chose to miss him! In an instant, he again decided to proceed and sideswiped me on my left side. I and my motorcycle hit the pavement. The driver of the car continued on his way!

My first thought was that I must not be too badly hurt, because my glasses were still on (because of my helmet's face shield). When I tried to get up, I couldn't. A passing motorist stopped to help, summoned police and an ambulance.

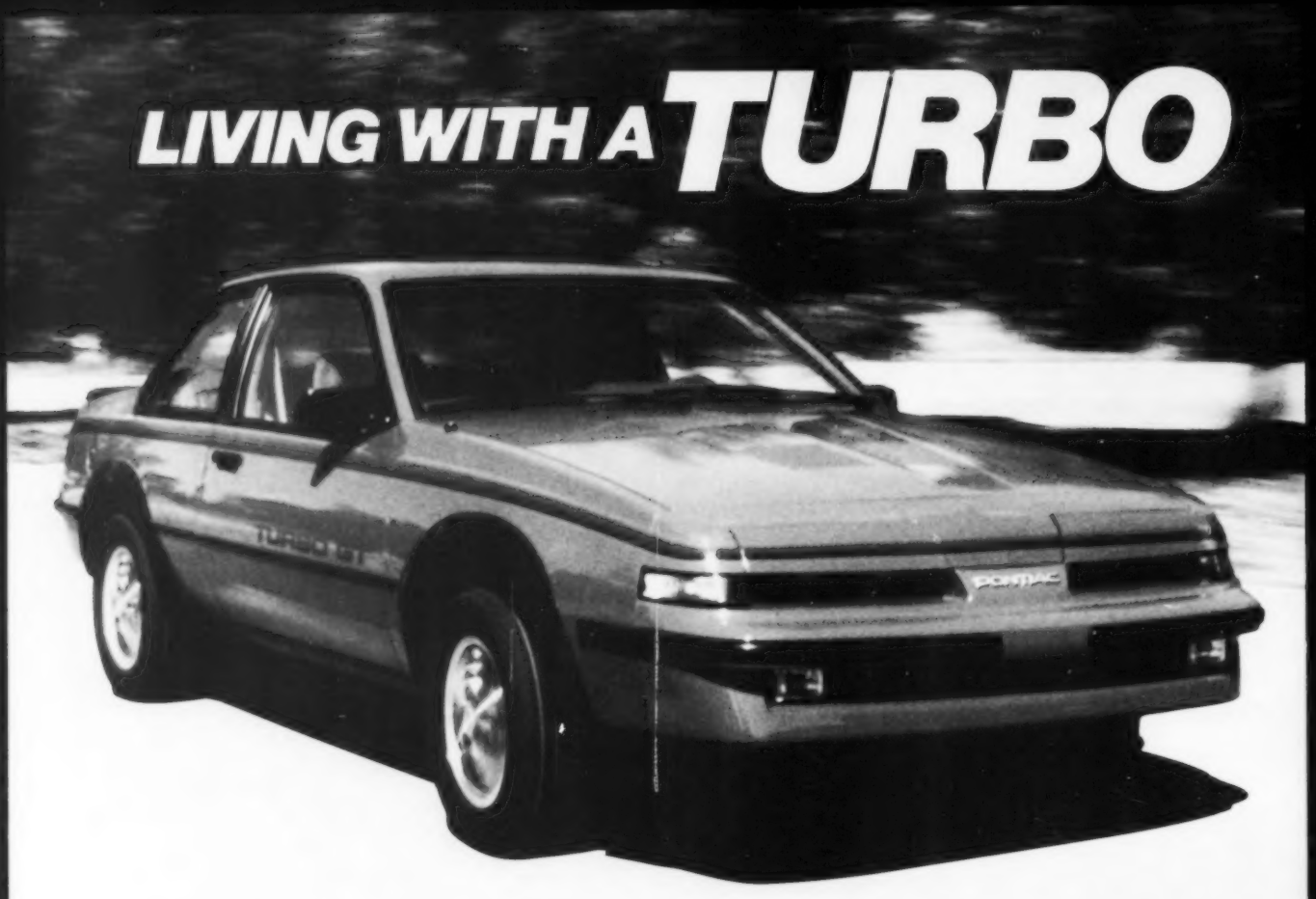
In spite of the fact that I was wearing heavy Kletter boots, the X-rays of my left foot looked like a jigsaw puzzle. The bottom of the foot was torn immediately below all the toes from the force of the cycle's gearshift lever being sheared completely off. Although my knee was numb, my jeans prevented any abrasions.

My doctor stitched up my foot and carefully watched it for a couple of weeks, hoping circulation would return to a couple of the toes. When it didn't, I had two toes amputated.

What about the hit-and-run driver? The police picked him up later that night using the description of the car provided by that Good Samaritan passing motorist who stopped to help me out. He was charged with failure to stop and render aid and failure to yield the right-of-way and was ordered to pay a stiff fine and restitution to me. He was placed under probation, but later left the country, out of control of the probation office.

Now to the helmet! There was a large gash across the left side; the doctor told me that if I hadn't had it on, I probably would have had a concussion and would be minus my left ear. Because I had on heavy boots, I lost only two toes instead of my whole left foot. Do I believe in motorcycle helmets and protective gear? You bet!

LIVING WITH A TURBO



THE BACKYARD MECHANIC

A Turbocharger can give a car Jekyll and Hyde personality. One minute it's an economy coupe, the next it thinks it's a fire-breathing, V-8 wheel spinner.

A turbocharger can be a dream come true and a true nightmare. It can be a dream come true when it gives you a combination of economy and performance. It can also be a true nightmare if it starts giving you problems or fails.

For example, the engine your turbo is attached to may have started life as a fuel-economy champ. It is happy to hum along all day, day after day, on very little gas. This unassuming little engine gladly putts you around town and produces fantastic miles-per-gallon figures cruising on the interstate.

What it doesn't do is push you back in your seat when you stomp on the gas pedal.

Attach a turbocharger to that little engine and you get a Jekyll and Hyde transformation. Suddenly — when the turbo kicks in — that modest, four-cylinder engine thinks it's a fire breathing V-8 and launches you down the highway with break-neck acceleration.

Of course, when something goes wrong with the turbo it can become a real nightmare. To replace a turbocharger in most American-made cars will cost you slightly more than $500 — exchange. That means you're giving them the old turbo in exchange for the new one. On most of your foreign-made models the turbocharger alone can cost upwards of $1,500. Plus you could be charged up to eight hours labor for removing the old unit and installing the new one.

Most mechanics can't disassemble and repair turbo units.

Because of the hostile environment in which a turbo operates, if you don't treat it right it will fail sooner than later. The life expectancy of a turbo is between 80,000 and 120,000 miles, provided it receives tender, loving care.

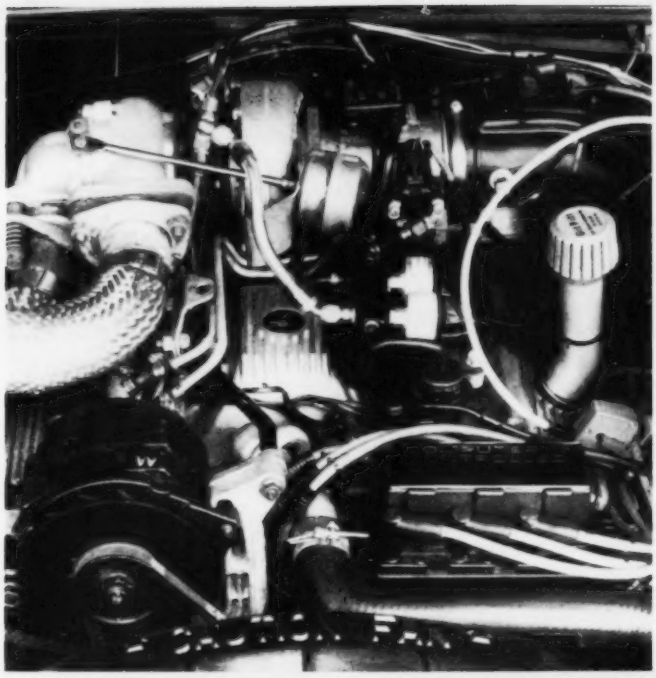
Living with a turbocharger is similar to living with anything: You have to start by getting to know the other party to the living agreement first.

To begin with, automotive engines are basically pumps. They draw in an air/fuel mixture and puff out the hodgepodge that's left after combustion. One of the best ways to increase an engine's performance is to increase its pumping ability.

Any engine power output increase is the direct result of increasing its volumetric efficiency. Volumetric efficiency is the amount of air/fuel mixture the engine inhales on the intake stroke as compared to completely filling the cylinders.

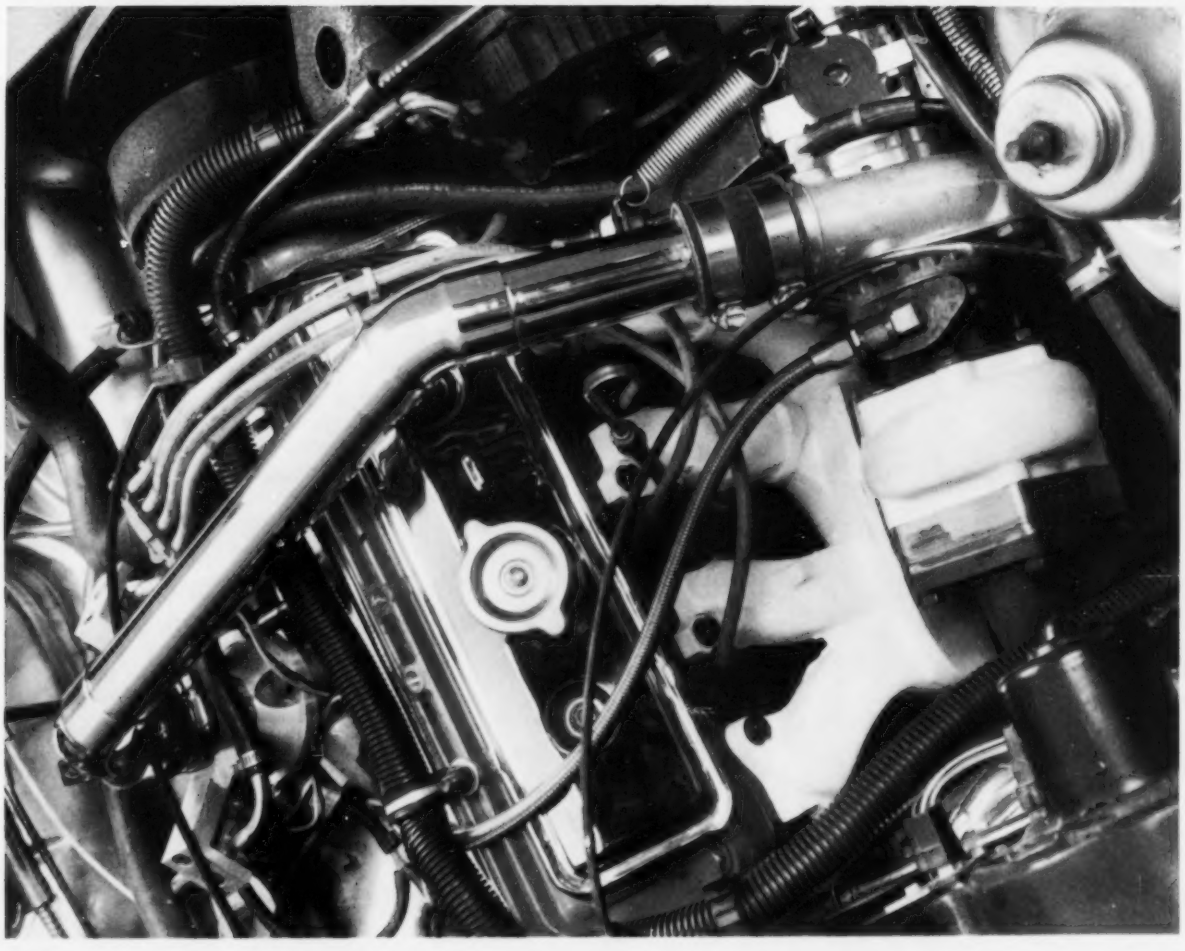
There are several limitations that make it impossible for the engine to fill the cylinders 100 percent on the intake

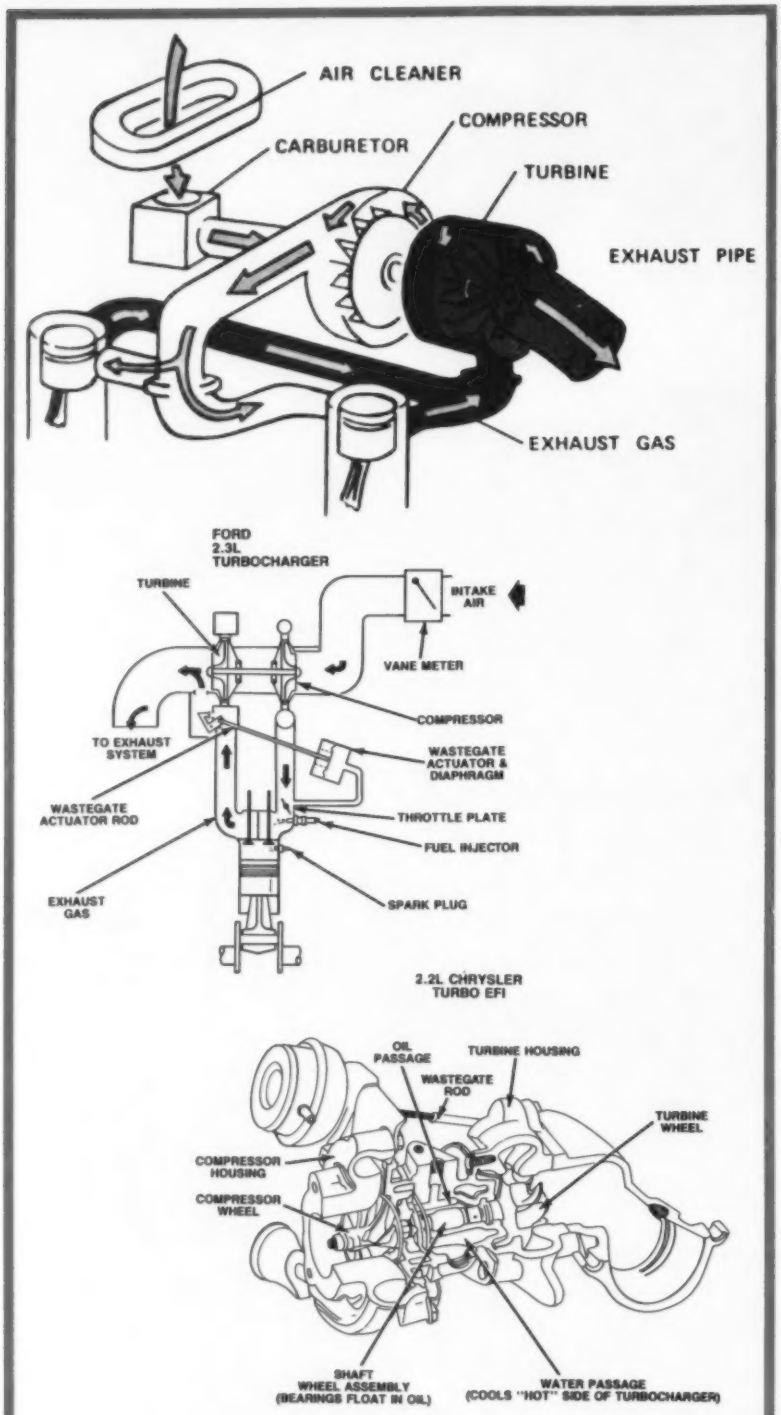
continued



(left)
The underhood plumbing of a turbocharger can make an already tight place tighter.

(below)
Not all turbocharged cars are factory stock. Here's a Chevette engine with turbocharger and electronic fuel injection boosting its 63 horsepower to 100.





The basics of turbocharging can be seen here. As you can tell there are several different ways of doing the same job.

strokes. These limitations include valve and port diameters, intake manifold design, valve timing, engine speed and atmospheric pressure.

This is where a turbocharger comes in. It forces more air into the engine at pressures higher than normal. The increased pressure forces more air into the cylinder than it could draw in normally, allowing the engine to burn more fuel and in turn produce more power. By forcing this air into a small engine, it can increase its power by as much as 60 percent or more. And that's what superchargers and turbochargers do.

A supercharger is an air compressor driven off a mechanical coupling (belt, chain, shaft, etc.) from the engine crankshaft. It draws power from the engine at the same time it is increasing the output.

On the other hand, a turbocharger differs from a supercharger because it draws no mechanical energy from the crankshaft, but is also driven by compressed gases. Its turbine wheel is driven by heat energy and pressure of the spent exhaust gases. Therefore, no load is put on the engine to drive the turbine.

HOW IT WORKS

The spent exhaust gases enter the turbo on the "hot side" and apply force against the turbine blades. This force spins the turbine much like wind turns a windmill. The exhaust gases then leave the turbo into the conventional exhaust system.

Opposite the "hot side" of the turbo on the same shaft as the turbine is the compressor stage. This draws air in at atmospheric pressure and compresses it to raise the pressure. This compressed air is then forced into the intake manifold and cylinders.

Whenever the engine runs, the turbine spins. However, at low engine speeds, the engine draws air in faster than the turbo can compress it. Because the engine draws air in, the manifold pressure is lower than atmospheric pressure. This causes a vacuum in the manifold.

As the engine rpm's rise, the volume of exhaust gases increases. Eventually the exhaust gases spin the turbine so fast that the compressor stage pumps air in faster than the engine vacuum can draw it into the cylinders.

When this happens, the intake manifold goes from a vacuum to a pressure condition. Pressure in the intake manifold is commonly called "boost."

Boost is any pressure above normal at-

A lot of the secrets to living with a turbo are behind the steering wheel. Always let the engine idle after starting until the oil is flowing. Then watch the boost gauge (upper left hand corner of the tachometer on the right) to be sure you don't "get it on" before the engine warms up. Then let the engine idle after stopping before turning the ignition off.

mospheric pressure. Normal atmospheric pressure is 14.7 psi (lbs./sq. in.) Therefore a blower providing 10 psi of boost is forcing air into the cylinders at an absolute pressure of 24.7 psi. Some boost gauges read in atmospheres, where one atmosphere equals 14.7 psi, two 29.4, etc.

Boost in the intake manifold has several benefits that make the engine run better. During valve overlap (and before the intake stroke begins) clean air rushes across the combustion chamber. This fresh air scavenges all remaining gases from the cylinder heads, pistons, valves and, to some degree, the exhaust gases.

Clean burning of the air/fuel charge (plus the engine cooling effect) helps to extend engine life.

As the turbo compresses the air it also increases its temperature. Under boost conditions, it is not uncommon for the air entering the compressor to increase from 70 degrees Fahrenheit to as much as 200 degrees F.

This temperature increase has a plus and minus side. For the plus side, the added heat aids in vaporizing the fuel for better burning. However, on the minus side the heat also increases the possibility of spark knock.

LIMITS

The boost must be limited; otherwise the pressure could get too high for the cylinders. Also the temperatures could be more than the engine could tolerate.

One way to limit pressure is with a wastegate. With this device, when boost reaches a predetermined amount a diaphragm valve moves against spring pressure. As it moves, it forces a non-adjustable rod to open the wastegate. As the gate opens, exhaust gases by-pass the turbine wheel and flow directly into the exhaust system.

With the wastegate open, the amount of exhaust gases that turn the turbine is limited because some of the gases are flowing directly out the exhaust. When this happens, the compressor wheel speed slows down until the boost drops below the pre-set pressure and the wastegate again closes.

Every turbocharged engine has a different wastegate opening setting. For example, on Chrysler's 2.2 -liter Turbo EFI engine, it is 7.2 psi, while Ford's 2.3 turbocharged engine has a wastegate that remains closed until manifold pressure reaches 9.5 to 10.5 psi.

At part throttle and during cold starts, the wastegate remains closed.

continued

Lubrication is the other key to living with a turbocharged engine. Be sure to check and change your oil often.

Use the best oil available and make sure it's an "SF" oil.

PRECAUTIONS

Now that you know a little about how a turbocharger works, it's time to talk about the tender loving care necessary to help the turbo survive.

When starting a turbocharged engine, be sure not to rev it up (speed the engine up to high rpm) until after it has idled for several minutes. This will allow the oil to get circulating and protect the bearings of the turbo.

If the car hasn't been driven for several days, allow plenty of extra time for the engine oil to circulate through the system before driving off.

Be sure the engine oil is completely warmed up before pushing the throttle hard enough to cause the turbo to boost the system. If your vehicle doesn't have a boost gauge to tell you when the turbo is pressurizing the system, check the owner's manual for information about when the boost kicks in. If you have neither a gauge or manual, you can probably tell by the seat of your pants when the turbo starts kicking more horsepower out of the engine.

The turbocharger's life depends on oil properly lubricating its bearings because the turbine can be spinning as fast as 120,000 or more rpm when operating. Therefore, the oil that you use must be of the highest quality and clean. There are even oils specially formulated for turbo use. But always use an engine oil with the API classification of "SF". And change the oil and filter regularly.

There are a couple of precautions you should follow when changing the oil in a turbocharged engine. One is to fill the new filter with new oil before installing it. This will help the engine develop oil pressure sooner.

The other, and more important precaution, is to disconnect the coil before starting the engine after an oil change. Then crank the engine with the starter until the engine builds up operating oil pressure. Then reconnect the coil and start the engine. This way there should be oil in the turbo bearings when the first blast of exhaust gases arrive to start the turbine spinning. Nothing ruins bearings faster than starting up dry.

When replacing a turbo, remove the oil pipe inlet and pour fresh engine oil directly into the fill port to pre-lube the shaft bearings. This, again, prevents dry start-up.

Before turning the engine off, let it idle

for more than a minute. This will allow the turbine to slow down and the unit to cool off. If you have just finished a hard or high speed run, allow the engine to idle for a longer time.

If the engine is stopped suddenly, the very hot turbocharger will bake the oil that is left on the bearings into a "coke." This gritty material will destroy the bearings in very little time.

TROUBLESHOOTING

Some of the more common troubles associated with turbocharged engines and their causes are listed here to help you with a sick engine.

Engine Detonation

- Malfunction in spark advance or retard system
- EGR system defect
- Carburetor or turbocharger air inlet restrictions
- Actuator allows too much boost
- Defect in carburetor power system
- Internal turbocharger defect

Low Engine Power

- Air inlet restriction
- Exhaust system restriction
- Malfunction in spark advance or retard system
- EFE system defect (GM only)
- EGR system defect
- Carburetor power system
- Turbocharger defect

Engine Surges

- ESC malfunction
- Defective vacuum switch
- EGR system defect
- Loose turbocharger bolts on compressor side

Oil Consumption; Blue Exhaust Smoke

- Leak at turbocharger oil inlet
- Turbocharger oil drain hose leaks or stopped up
- Internal turbocharger defect

Black Exhaust Smoke

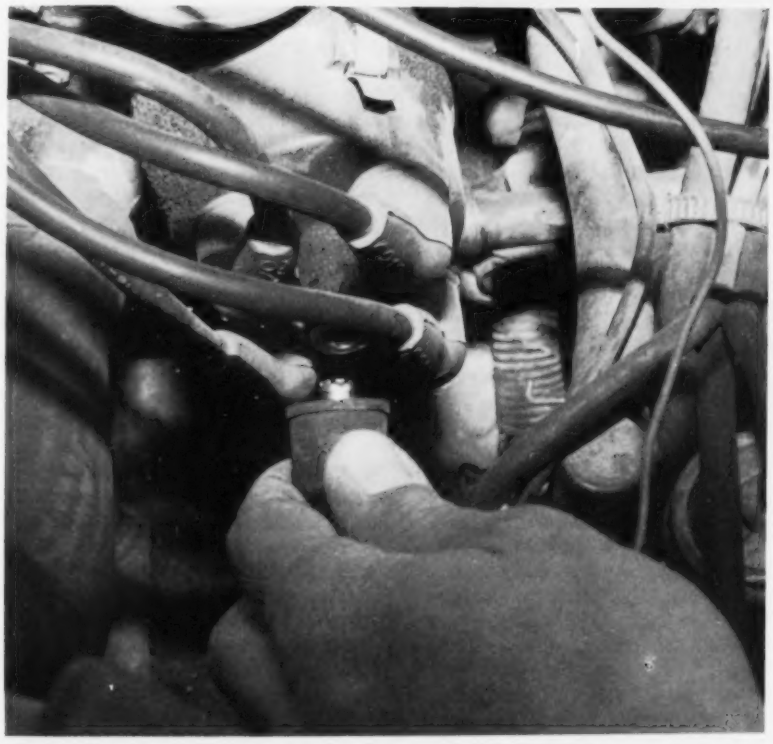
- Defective vacuum switch
- Carburetor defect

Engine Noise

- EFE system defect (GM only)
- Loose or leaking exhaust system
- AIR system defect
- Restricted turbocharger oil supply
- Internal turbocharger defect

Armed with this information and following the tender, loving care hints provide there's no reason why you and your turbocharger can't live together for many tens of thousands of miles.

When changing the oil, fill the new filter before installation.



After an oil change, disconnect the coil before cranking the engine. Crank the engine until there is good oil pressure. Then reconnect the coil and start the engine.

Backfire LETTERS TO THE EDITORS

LEARNED A VERY VALUABLE LESSON

I have read your magazine every month and find it interesting to read about individuals who have been in car accidents and didn't wear their safety belt but just happened to buckle up the day of the accident. I thought you and the readers might want to hear my story.

I was stationed at Ft. Dix, N.J., and got orders to go to Ft. Richardson, Alaska. I had just bought a new 1985 Toyota 4 Runner and decided to drive cross-country and have it shipped from Seattle, Wash.

The day I left from New Jersey, we had received a good foot of snow and it was still snowing. So I put the vehicle in four-wheel drive and headed to Iowa first to visit my family before going to Washington. The roads were bad, but not to the point where they shut down the highways. I kept driving, stopping here and there to get something to eat and to sleep for a couple of hours. As soon as I hit the Iowa border I said to myself, "I'm almost home, just another 60 to 100 miles to go."

I had tried to pass a semi-trailer and found my back-end fishtailing a little, but I controlled the skid and never thought any more about it. All I could think of was getting home to my family. I drove further and found I was all by myself. There was no one near me at all. Then it happened. I hit a patch of ice and the back-end fishtailed to the left, then the right. Kept going back and forth. I was trying to control it but it just wouldn't come out of it. I then skidded to the right shoulder and the back-end fishtailed to the left and I was skidding on the shoulder sideways. The truck then went down into the grassy (snowy) part and rolled onto the left side, the top, the right side, the left side, then finally onto the top and skidded some more. When the truck finally stopped I unbuckled my safety belt, turned off the radio, put the back window down, turned off the vehicle and crawled out the back. There was a trucker going the other direction who had gotten on his CB and told the State Troopers they might have a fatal one on their hands, as fast as I was rolling and skidding.

When day came around, the State Trooper said I could drive the vehicle home. My sister came after me and I followed her home. As I was driving I had to lean my head down because the roof was smashed in. But I never hit my head once against the smashed roof when I was rolling, because of my belts. The total damage to the vehicle was over $3,500.

I grew up in Iowa for 18 years but it never hit me that Iowa roads are always bad during the winter season. Before I left New Jersey I told myself "I will wear my safety belt because I'm going long distance." Now, no matter if it's long distance, short distance or even as a passenger, I wear my safety belt all the time. I have learned a very valuable lesson and will never forget it.

SP4 Teresa L. San Miguel
Ft. Richardson AK 99505-5640

SAVED BY THE HELMET

I started riding motorcycles at the age of 25 and always considered myself to be a mature operator. I always wore a helmet, a long sleeved shirt or jacket, long pants, hard soled shoes, etc. It wasn't until 1984 that the common sense of wearing these articles was really driven home.

I was on my way home from work one afternoon around 5 pm. I had turned off of the main street onto a side street and was proceeding at about 35 mph. About half-way through the first block, I saw that the light at the first intersection had turned green. This meant that I had plenty of time to make the light. Just as I approached the intersection, a blue AMC Gremlin came through the red light and entered the intersection from my right. I applied my brakes, trying not to lock up the front wheel, the way I was taught in my Motorcycle Safety Course. Unfortunately, it was too late and I wasn't able to avoid the car. My front wheel struck the driver's door at what I would guess was 15 mph. I was able to hold onto the handle bars, avoiding a bad throw, but I went through a very violent snapping of my whole body. According to witnesses, my head struck the roof of the car and bounced back like a basketball. I suffered multiple cuts to my chin and neck (24 stitches worth) and some nasty bruises on my shoulders, chest and legs. When I looked at my helmet the next day there were several large gashes in the face shield and helmet with the blue paint still embedded in them.

When I recall this incident, it is obvious to me that if it weren't for my helmet and other safety clothing, I would probably not have walked away from that intersection. I can truly say that I was saved by the helmet.

Lt. William Crownover, USN
Brunswick ME 04011

WE ARE HIGH TECH!

I have been reading your magazine throughout my entire Air Force career and find your articles extremely informative. But there is one thing that really gets my goat. It's the title of your automotive maintenance section, BACKYARD MECHANIC. I resent my profession (General Purpose Automotive Mechanic) being stereotyped with backyard. I'm sure I speak for a lot of automotive technicians that feel the same. If you haven't realized by now, "We are High Tech!" May I suggest a new name: "DIY Mechanics," (Do It Yourself Mechanics).

TSgt. Thom Watkins, USAF
APO NY 09130

Of course we know you're high tech. We know you don't work in the backyard either. Our regular feature is meant for the amateur, not the pro.

EQUATION CORRECT IN MOST RESPECTS

Cmdr. Karl Koenig's letter in the November issue of DRIVER was correct in most respects when he says that raising the tire pressure raises the speed at which hydroplaning occurs. Unfortunately, the equation, as printed, shows that the speed can be raised by lowering the tire pressure. The correct equation is:

$$S = 10\sqrt{P}$$

where S is the speed in miles/hour, P is the pressure in pounds/square inch, and $\sqrt{\ }$ is the symbol for the square root. Again, this equation represents the best case.

You should also note that the new, wide, performance tires (e.g., 60 series, 50 series, etc.) tend to hydroplane at lower speeds although engineering work on the tread design (mostly from auto racing) is helping to alleviate that problem.

Robert Rosen
US Army Laboratory Command
Adelphi MD 20783-1197

EVERYONE'S RESPONSIBILITY

I am referring to the letter from SSgt. Gary W. Byers, USAF, in your December issue.

His scathing remarks regarding "other peoples stupidity" has me astounded. SSgt. Byers has carelessly laid the blame for motorcycle accidents on all "non-riders."

As both a rider and driver, I feel it should be said that not all accidents with motorcycles occur because drivers ". . . just didn't see them." How many times have you witnessed motorcycle drivers zipping in and out of traffic, cutting it so close you wonder why he's not dead yet?

My point is just this: One side should not point fingers at the other. Rather, *all* drivers and riders should learn from past mistakes and pay attention while on the road. Driving safely is *EVERYONE'S* responsibility.

SN Tammy Davis, USN
NAS North Island CA 92011

HEAR ME OUT

First, I would like to express my appreciation for several years of interesting reading. I greatly enjoy your magazine and find most of the entries informative and well written. I generally get a kick out of the BACKFIRE section, and on occasion I have been tempted to jot a few lines to make my own opinions known. This time I've decided to go ahead with it . . . to write a letter to the editor. This will be a first for me.

I have just read some of the letters from the December edition. May I add a few logs to the fire in the motorcycle vs. automobile controversy? Specifically, for SSgt. Byers and AS1 Brodie, I'd like to throw a slightly different perspective out for comment.

I've never owned a motorcycle. I will freely admit that and that I am therefore not an expert in motorcycle tactics, evasive maneuvers, riding skill development, safety equipment, or any of a number of other topics concerning two wheeled vehicles. However, I have been a collateral duty safety officer, a division officer, and a command duty officer. As such, I have participated in the investigation of several motorcycle mishaps and several automobile accidents. Rhetoric to the side, the drivers of the automobiles fared much better than the riders of the motorcycles when all was said and done. To me, that is the bottom line in the argument between riding a motorcycle and driving a car.

As a naval officer . . . no, let's generalize that . . . as a military officer, I'm expected to know a little about taking acceptable risks to achieve tactical or strategic advantage. We can further generalize to say that, as a supposedly intelligent human being with extensive volitional control over my own behavior, I must take the responsibility of assessing risk in performing my life functions. So, yes, we are free people in this country. We are allowed by law to assume acceptable risks in pursuing 'life, liberty, and the pursuit of happiness.' We are even allowed to assess risks differently. You can ride your motorcycle . . . I will stick to my car. I will also encourage my sons to stick with a car because, you see, I've assessed the risks and feel that motorcycles present an unacceptable risk on the American highways.

SSgt. Byers, you are angry at drivers who 'just didn't see' your friends. Well, I have to freely admit that I occasionally miss a single headlight among the dozens of others visible when I'm merging into traffic on the freeway. I drive conservatively and always look at least twice before changing lanes, but even an alert, conservative driver can be confused in some situations. I think you'll admit that a two-ton car is a bit harder to overlook than a relatively little motorcycle. Even if a car is overlooked, its driver is a lot more likely to survive an accident than a motorcycle rider in a similar situation.

AS1 Brodie, you'll make your own choice, and I'll just have to live with it. But I'm a Casualty Officer now, so sooner or later I have a much better chance of meeting your family than that of SSgt. Zenda. Yes, people die every day. Just because we lost one space shuttle doesn't mean that space shuttles are bad. Just because we lost a life to a motorcycle accident this week doesn't mean motorcycles are bad. Just because I've personally buried three motorcycle accident victims in my years of commissioned service (and never an auto accident victim) doesn't necessarily mean that motorcycle riders are any less safety conscious than automobile drivers. But somehow the numbers just keep stacking up . . . somehow there are still more motorcycle fatalities than automobile fatalities in their respective groups. So whose choice is it? Acceptable risk, I mean.

Let's face it, motorcycles are cheaper (meaning less expensive) than automobiles. They use less fuel. They are probably lots of fun to ride. But they don't offer the rider much in the way of accident survivability.

Okay, here comes the opinion. I believe that motorcycles are superior recreational vehicles (from what I've heard) and great for long distance driving at low cost in *low* density traffic. I also believe very firmly that motorcycles present a clear danger to their riders in high density traffic. Yes, that means I don't think they are appropriate for urban driving.

That said, I'll sit back now and let the controversy rage. But I'll also study my manual, and I hope you riders won't mind if, upon leaving the home of the bereaved family, I take a moment to shake my head and regret the fact that people will insist on taking unnecessary risks in the name of freedom of choice.

Thanks for hearing me out.

LCDR Steve Phillips, USN
San Diego CA 92124

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AVOIDING A HEAD-ON COLLISION

The most harmful of all collisions is the head-on. Many such accidents could be avoided if drivers used all their skills.

- *Watch Ahead.* If you scan ahead you can usually see a problem developing in time to take action.
- *Keep right.* Don't crowd the centerline. On a four-lane road, make a habit of driving in the far right lane.
- *Slow down.* If you spot oncoming traffic moving toward you, sound your horn or flash your lights. Slow down. Give the other driver time to get back to the proper lane.
- *Go right, not left.* If the oncoming driver is not correcting, move right onto the shoulder. Into the ditch is better than a head-on. Don't go left. If the other driver recovers, his or her instinct will be to swerve back into the proper lane and you will have the head-on you were trying to avoid.
- *Don't panic.* Most drivers don't take advantage of the steerability of their vehicle. Don't slam on the brakes. Stay in control.